

REMARKS

Claims 1, 6, 8, 10–14, and 16–30 are pending in the present application. Of these, Claims 14, 21, 22, and 30 are canceled, Claims 1, 20, and 23 have been amended, and no claims have been added, leaving Claims 1, 6, 8, 10–13, 16–20, and 23–29 for consideration upon entry of the Amendment.

Amended Claims

Claims 1, 20, and 23 have been amended to place them in better condition for allowance or appeal, and therefore Applicants believe that all amendments should be enterable under 37 C.F.R. § 1.116.

Specifically, Claim 1 has been amended to remove the term “non-hydrocarboaceous polar group” and to remove boron and phosphorous containing functional groups from the Markush group.

Claim 20 has been amended to include the limitations of Claims 21 and 22, canceled herewith, to rewrite these three claims as a single claim to place the claim in better condition for appeal. All support for these amendments to Claim 20 can be found in Claims 21 and 22, currently under rejection. Claim 23 has accordingly been amended to correctly depend from Claim 20.

No new matter has been introduced by these amendments, and as support for the amendments is found in the existing claims, none of the amendments should necessitate any new search on the part of the Examiner. Applicants therefore believe the Examiner should find the amendments herein to be enterable without need for filing a request for continuing application.

Reconsideration and allowance of the claims is respectfully requested based upon the above amendments and the following remarks.

Claim Rejections under 35 U.S.C. §102(b)/103(a)

Claims 1, 6, 8, 11–14, and 16–30 are rejected under 35 U.S.C. §102(b) as allegedly being anticipated by, or in the alternative under 35 U.S.C. § 103(a) as unpatentable over, U.S. Patent No. 6,455,650 (“Lipian”). Applicants respectfully traverse this rejection.

Lipian discloses a method of making cycloolefin polymer with a cationic

Group 10 metal (M) complex and a weakly coordinating anion (WCA) having the formula $[(R')_z M(L')_x (L'')_y]_b [WCA]_d$, in which L' is a Group 15 neutral electron donor ligand, L'' , is a labile neutral electron donor ligand, the sum of x , y , and z is 4, and b and d are integers. Abstract. Lipian teaches that a *catalyst* can be prepared *by reacting* a precatalyst with desired ligands and weakly coordinating anion (WCA) salt. Col. 22, lines 28-38; *emphasis added*.

To anticipate a claim under 35 U.S.C. §102, a reference must disclose each and every element of the claim. *Lewmar Marine Inc. v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 1007 (1988).

Also, for an obviousness rejection to be proper, the Examiner is expected to meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

As maintained by Applicants, Lipian fails to disclose the polymer yield for the polymer provided by the above combination of monomer and precatalyst, and further fails to disclose any expected yields for any combinations of norbornene monomer and catalyst outside of the Examples.

One skilled in the art will readily appreciate that the resulting yield of a polymerization using a particular catalyst will depend on the characteristics of the monomers being polymerized. Though Lipian discloses many examples of catalysts and monomers, not all of the catalysts disclosed in Lipian are taught by example to be useful for the polymerization of all of the monomers.

Specifically, the reactivity and the product yield of the polymerization may vary depending on the combination of the catalyst and the functional group of the monomer (where a monomer can be *e.g.*, a substituted norbornene of Chemical Formula 5 as claimed in the instant Claims). As disclosed in Table 1 of the response filed on

January 22, 2007, the Examples of Lipian showing “a product yield of greater than 50 wt%”, as stated in the Office Action dated April 19, 2007, only use allyl palladium as a catalyst and a silyl norbornene monomer, which are not related to the present invention. Therefore, the present invention cannot be readily ascertained from the disclosure of Lipian, and instant Claim 1 and its dependents should therefore be allowable.

Regarding the Examiner’s statement that “it would not be difficult for one of ordinary skill in [the] art to recognize that the process of Lipian is capable of producing a product yield of greater than 50 wt% or more”, Applicants respectfully maintain, as argued in the response filed on January 22, 2007 and as reiterated herein, that Lipian fails to provide any disclosure or teaching that a catalyst mixture as claimed in instant Claim 1 is capable of providing a polymer from norbornene monomers having the polar groups as defined in amended Claim 1, at a yield of 50% or greater. To be anticipated, “[t]he identical invention must be shown in as complete detail as is contained in the *** claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Furthermore, the single source must disclose *all of the claimed elements* “arranged as in the claim.” *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1271 (Fed. Cir. 1984) (Emphasis added). Missing elements may not be supplied by the knowledge of one skilled in the art or the disclosure of another reference. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 780, 227 U.S.P.Q. 773, 777 (Fed. Cir. 1985). Applicants respectfully maintain that Lipian does not disclose the limitation that the method provide a yield of greater than 50% when polymerizing a norbornene monomer having a polar group using the catalyst mixture as claimed in Claim 1.

The Examiner discloses examples in which a yield of greater than 50% is achieved. See Office Action dated 4/19/07, p. 4; and Lipian, Col. 49-74, Examples 23-25, 28-31, 34, 37, 39, 42, 44-47, 51, 53, 58-76, 84, 88, 89, 95, 98, 102, 105, 107, 110-112, 115-117, 123-125, 129, 132, and 139; also examples 160-162; and Table 1 of the previously filed Amendment filed January 22, 2007, reproduced hereinbelow. Applicants include and refer to these examples in the updated Table 1, as well as additional examples 159, 165, 253, 281 and 282, and have updated the reference table to with the actual monomer used in example 134.

Table 1.

Example no. (from Lipian)	Catalyst	monomers
23-25, 28, 29, 37, 42, 51, 58, 84, 88, 89, 95, 98, 102, 105	(<u>allyl</u>)palladium chloride dimer	butylnorbornene + 5- <u>triethoxysilyl</u> norbornene
30, 31	(<u>allyl</u>)palladium trifluoroacetate dimer	butylnorbornene + 5- <u>triethoxysilyl</u> norbornene
34	(<u>allyl</u>)palladium (tricyclohexylphosphine) chloride	butylnorbornene + 5- <u>triethoxysilyl</u> norbornene
39, 59	{2-[dimethylamino]methyl}phenyl-C.N-}palladium (tricyclohexylphosphine) chloride	butylnorbornene + 5- <u>triethoxysilyl</u> norbornene
44-47, 60-62, 66-76	(<u>allyl</u>)palladium (tricyclohexylphosphine) triflate	butylnorbornene + 5- <u>triethoxysilyl</u> norbornene
53, 63	trans-di-(μ -aceto)-bis[o-(di-o-tolylphosphino)benzyl]dipalladium	butylnorbornene + 5- <u>triethoxysilyl</u> norbornene
64, 65	bis(tricyclohexyl-phosphine)palladium hydridochloride	butylnorbornene + 5- <u>triethoxysilyl</u> norbornene
110-112,	(<u>allyl</u>)palladium (tricyclohexylphosphine) (methyl)	butylnorbornene + 5- <u>triethoxysilyl</u> norbornene
115	(<u>allyl</u>)palladium (tricyclohexylphosphine) triflate	ethylnorbornene
116	(methallyl)nickel(tricyclohexylphosphine) triflate	norbornene
117	(<u>allyl</u>)palladium (tricyclohexylphosphine) triflate	butylnorbornene + ethyl ester of 5-carboxylic acid of norbornene
123-125	(<u>allyl</u>)palladium (tricyclohexylphosphine) triflate	hexylnorbornene+ 5- <u>triethoxysilyl</u> norbornene
129	(<u>allyl</u>)palladium (tricyclohexylphosphine)(trifluoroacetate)	hexylnorbornene+ 5- <u>triethoxysilyl</u> norbornene
132	(<u>allyl</u>)palladium dimer	butylnorbornene
134	(<u>allyl</u>)palladium dimer	Methylacetate of 5-norbornene methanol
139	(<u>allyl</u>)palladium chloride dimer	butylnorbornene
159, 165	Pd(ethylhexanoate) ₂ , P(C ₆ H ₁₁) ₃ , B(C ₆ F ₅) ₃ , Al(C ₂ H ₅) ₃	butylnorbornene
160-162	Pd(ethylhexanoate) ₂ , P(C ₆ H ₁₁) ₃ , B(C ₆ F ₅) ₃ , Al(C ₂ H ₅) ₃	butylnorbornene + 5- <u>triethoxysilyl</u> norbornene
253, 282	(<u>allyl</u>)palladium (tricyclohexylphosphine)(trifluoroacetate)	benzylether of 5-norbornene methanol (1 of 4 monomers)
281	(<u>allyl</u>)palladium (tricyclohexylphosphine)(trifluoroacetate)	benzylether of 5-norbornene methanol (1 of 3 monomers)
282	(<u>allyl</u>)palladium (tricyclohexylphosphine)(trifluoroacetate)	benzylether of 5-norbornene methanol (1 of 4 monomers)

As argued previously, and as can clearly be seen in the Examples in Table 1, the sole example in Lipian and of those examples reproduced in Table 1, that is prepared in part from a norbornene group with a polar group as claimed in Claim 1, can be found in Lipian in Example 117, in which the copolymerization of a norbornene ester using an *allyl* palladium complex provides for a polymer yield of 78%. Col. 69, line 62 to Col. 70, line 6. Lipian, however, does *not* disclose a yield of greater than 50% when

polymerizing a norbornene-based compound containing the polar functional groups and *using an non-allylic palladium complex* as claimed in amended Claim 1, and discloses only allyl palladium (tricyclohexylphosphine) triflate as an exemplary catalyst for polymerizing norbornene carboxylic acid derivatives. Lipian thus expressly fails to clearly teach the use of the catalyst mixture claimed in instant Claim 1, to polymerize a norbornene-based compounds containing the polar groups claimed in Claim 1, or that doing so would provide a polymer yield of 50% or greater when a non-allylic palladium catalyst is used, also as claimed in Claim 1. Thus, Lipian fails to disclose or teach all elements of the claimed method and does not anticipate the method as claimed.

Also, in Example 134, Lipian does teach that, where an norbornene ester based on norbornene methanol is homopolymerized, the yield is low (5%), indicating that high amounts of norbornene compounds having ester groups provides a reduced yield, and thus would provide no expectation that any of the disclosed catalysts would uniformly provide the desired cycloolefin polymer in a yield of 50% or more as claimed. Thus, not only does Lipian fail to anticipate the instant claims, there is neither a teaching nor motivation to modify Lipian to remedy the deficiencies of Lipian, nor is there an expectation of success, based on the combined teachings of Examples 117 and 134 of Lipian. Further, Examples 159-162 and 165 of Lipian do not disclose a working embodiment of a catalyst that is equivalent to the catalyst mixture of the instant claims, as the components of the exemplary catalyst used include a trisubstituted boron cocatalyst, and not a tetrasubstituted boron cocatalyst as claimed in Claim 1 in Chemical Formula 4

The Examiner states that though “Lipian et al. do not contain a working example using the claimed catalyst for polymerizing the disclosed monomers at a product yield of greater than 50 wt%, Lipian et al. still have clearly disclosed the catalyst and the monomers as claimed. Applicants respectfully disagree, and maintain that Lipian with all of its extensive disclosure fails to teach with any clarity the working combination as claimed in instant Claim 1, and therefore does not anticipate Claim 1. In order to anticipate, a piece of prior art must *clearly and unequivocally disclose the claimed composition or direct those skilled in the art to the composition without any need for picking, choosing, and combining various disclosures* not directly related to each other by the teachings of the cited reference. *In re Arkley*, 59 CCPA 804, 455 F.2d 586, *Air*

Products & Chemicals, Inc. v. Chas. S. Tanner Co. 219 USPQ 223, *Perricone v. Medicis Pharmaceutical Corp.* 267 F.Supp.2d 229. (Emphasis added) Applicants respectfully assert that Lipian does not direct one skilled in the art to choose either the embodiment wherein the catalyst components are pre-reacted to form a complex, or reacted *in situ* to form a complex (both as disclosed in Lipian), and thereby does not direct one skilled in the art to the use of a catalyst *mixture* (in which the catalyst components are mixed without reacting the components either extra-polymerization or *in situ*) to form a catalyst mixture as disclosed in the instant Specification and as claimed in Claim 1, arguments in support of which were entered previously and are of record in the Response to Office Action filed August 22, 2006.

Comparing the Examples of the instant Specification with the disclosed examples of Lipian, and as argued previously, the latter does not direct one skilled in the art to choose palladium complexed as bis-acetylacetonate palladium, Pd(acetate)₂, or Pd(acetylacetonate)(acetate), from among the 28 different metal salt and the 42 different metal-ligand combinations disclosed in Lipian in Col. 21, lines 3-35 and in Col. 19, lines 1-44; nor does Lipian direct one skilled in the art to choose tricyclohexylphosphine from among the hundreds of different examples of potential first cocatalysts disclosed in Lipian in Cols. 9-13; nor does Lipian direct one of ordinary skill in the art to select tetrakis(anilinium)perfluorophenylborate from among the approximately 260 kinds of ionic cocatalysts disclosed in Lipian in Cols. 26-29. Thus, though Lipian discloses numerous palladium precatalysts, catalysts, and combinations generically, Lipian fails to direct one skilled in the art with specificity to the combinations of all the thousands of possible combinations selected from those precursor species, even selected from those components most readily available commercially, that could possibly provide a yield of greater than 50% as claimed. The effect of the disclosure of a genus on the patentability of a species depends on the size of the genus and the disclosure of preferred sub-genera and/or species, if any. With a genus of sufficiently limited and defined substituents, one may find anticipation. *Ex part A*, 17 U.S.P.Q.2d, 1716, 1718 (Bd. Pat. App. & Int. 1990). In other words, a genus will anticipate a species within that genus but not expressly disclosed, if one of ordinary skill in the art “would immediately envisage” the claimed compound from the disclosed genus. *In re Petering*, 301 F.2d 676, 682, 133 U.S.P.Q. 275, 280 (C.C.P.A. 1962). Lipian, in failing

to provide exemplary disclosure of a method for polymerizing the combination of norbornene having polar groups as specified in Claim 1 of the instant claims, with the particular sub genera and species of the catalyst mixtures of the Claim 1, fails to provide a disclosure that would allow one skilled in the art to “immediately envisage” the claimed invention.

Thus, while Lipian may be reasonably held to direct one of skill in the art to combine one or more of the discussed elements to provide a catalyst for use with a norbornene monomer in general, and specifically a norbornene substituted with an alkyl group, silyl group, or in the instances referred to above (Examples 117 and 134 of Lipian) an ester group, Lipian does not provide adequate direction to pick and choose the specifically selected elements from among the extensive and myriad number of possibilities as disclosed therein and as argued above, to define a method and select catalyst useful for providing a polycycloolefin in a yield of greater than 50%, as is instantly claimed in Claim 1 and its dependents. Lipian, for all of its extensive disclosure, fails to teach a method using the catalyst mixture claimed in Claim 1 that provides a yield of greater than 50% for the claimed polar cyclic olefin monomers of instant Claim 1, and thus fails to teach or disclose a method that includes the specific combination of all necessary elements of the monomer, the isomeric composition of the monomer, the precatalyst, and the cocatalysts *in the specifically claimed combination* to provide the catalyst mixture that can in turn provide a polymer yield of greater than 50%, as claimed in Claim 1. Lipian thus fails to disclose all elements of the instant claims, and fails to teach the invention in a way that would anticipate the instant claims, and therefore fails to anticipate the instant claims.

Further, and in addition to the examples cited above as evidence that Lipian does not teach the specific combination of instant Claim 1, Applicants wish to point out Comparative Examples 5 to 7 of the present application, which show that the polymerization of 5-norbornene-2-carboxylate as claimed in Claim 1 of the instant claims cannot be accomplished by using [(allyl)PdCl]₂, which is an allylic catalyst as disclosed and exemplified in Lipian. Thus, allyl palladium compounds as exhaustively disclosed and relied upon in the disclosure of Lipian are not of use in the present invention.

As to the Examiner’s assertion of obviousness, because Lipian fails to teach or

disclose all elements of the instant claims as discussed hereinabove, Lipian therefore also fails to make the claims unpatentable. In addition, the lack of any teaching that would encourage one skilled in the art to pick and choose the catalyst mixture from among the myriad number of possible combinations clearly does not teach the invention as claimed, nor would the lone exemplary embodiments of Lipian in its disclosure of Examples 117 and 134, provide a reasonable expectation that even if Lipian were modified to provide the catalyst mixture of the instant claims in combination with the monomers as claimed would provide a reasonable expectation for success for the combination.

In addition, the combination of catalyst mixture and monomer as claimed in instant Claim 1 is not obvious simply because of the unpredictability of the field of catalysts, as exemplified in Lipian and in the examples of the instant Specification, and because the teachings are only directed to the use of allylic palladium complexes for copolymerizing alkyl norbornenes and the ethyl ester of norbornene carboxylic acid. The mere fact that a known compound is a catalyst does not render obvious later discovered catalytic activity toward a distinctly different compound notwithstanding close structural similarity: "catalytic action [] cannot be forecast by chemical composition, for such action is not understood and is not known except by actual test." *Corona Cord Tire Co. v. Dovan Chemical Corp.*, 276 U.S. 358, 369 (1928) (copy attached).

This holding continues to be recognized and amplified.

The conclusion that [applicants'] invention would have been nonobvious to one having ordinary skill in the art on the basis of the cited art is [] buttressed by the fact that the claimed invention is a catalytic process. The unpredictability of catalytic phenomena has been recognized. . . [A] successfully catalyzed process depends not only on the particular catalyst that may be employed but also on the environment within which the catalysis is accomplished. . . The adequacy of any showing of equivalency must be scrutinized especially carefully where it is alleged to have been obvious to substitute one starting material for another in a *catalytic* process.

The court's requirement of an actual test to determine if the catalyst would possess activity under the given circumstances alone is a strong indication that the disclosure of Lipian teaches away from the invention of the instant claims, and therefore

would not render the instant claims obvious.

For these reasons at least, Lipian does not teach all elements of the claimed invention and cannot anticipate the present invention, nor does Lipian make unpatentable the above invention. Applicants therefore respectfully request withdrawal of the rejection and allowance of the claims.

Claims 20–24 have been rejected under 35 U.S.C. 102(b) as allegedly being anticipated by, or in the alternative under 35 U.S.C. § 103 (a) as obvious over Lipian. Applicants respectfully traverse this rejection.

Amended Claim 20, which includes the limitations of Claims 21 and 22 as originally filed, recites the molecular weight of the cycloolefin polymer containing a polar functional group, the retardation value of the optical anisotropic film, and the relationship of the refractive indices n_x , n_y , and n_z of the optical anisotropic film. Lipian, does not disclose the molecular weight of the cycloolefin polymer having polar functional groups as prepared by the method of claim 1, as the only disclosure of molecular weight in Lipian is provided in the examples, and is directed to exemplary compositions that do not include the monomers as claimed in instant Claim 1 from which Claim 20 depends. No molecular weight data is thus disclosed in Lipian for the polymers having carboxylic acid groups as provided in examples 117 or 134, and therefore Lipian does not teach or disclose all elements of the instant claims. For this reason alone, Claim 20 is neither anticipated by nor obvious over Lipian.

Lipian also fails to disclose the properties of the optical anisotropic film. Though the Examiner has stated in the Office action that the properties of the optical anisotropic film of amended Claim 20, and as originally claimed in Claims 21 and 22 (now canceled), these properties cannot properly be considered to be inherent to the polymers of Lipian as Lipian fails to teach or disclose that such polymers made as claimed in instant Claim 1 and having the requisite molecular weight and refractive index properties as claimed would be obtainable by the methods exemplified in the Examples of Lipian, particularly in Examples 117 and 134. Lipian fails to disclose these properties, and therefore does not teach or disclose all elements of the instant claims. Therefore, Claims 20, 23, and 24 are neither anticipated by nor obvious over Lipian. Nor is there any reasonable expectation that a polymer having polar monomers

as claimed in instant Claim 1 would possess the requisite molecular weight or refractive index as claimed, and therefore there is no reasonable expectation that the modification would be successful.

In addition, Claims 20–24 depend from Claim 1. As argued hereinabove, Lipian fails to teach all elements of the method of Claim 1. Specifically, Lipian does not disclose or teach a catalyst mixture, nor does Lipian disclose the method in its entirety of the catalyst mixture as applied to the polymerization of a norbornene monomer having polar groups, all as claimed in instant Claim 1. Further, Lipian fails to disclose or teach polymeric yields of greater than 50% when a monomer solution comprising a norbornene-based compound containing a polar functional group is converted in the presence of the catalyst mixture comprising a precatalyst containing a Group 10 transition metal having a ligand containing oxygen ions bonded to the metal. Thus, Lipian fails to teach or disclose all elements of the instant claims and does not teach or suggest modifying the disclosure of Lipian by using the catalyst mixture as claimed in the instant claims, or by selecting from among the myriad number of choices of catalyst components to prepare a catalyst composition that might provide the desired cycloolefin polymer from norbornene monomer having polar groups as argued above. Therefore, Lipian fails to either anticipate Claims 20, 23 or 24 or make these claims unpatentable.

Also, as argued previously in the Reply filed January 22, 2007, regarding instant Claim 29, Lipian is silent as to the isomeric ratio of exo to endo for the norbornene monomers having the polar group, which is more than 50 mol% exo as claimed in Claim 29. One skilled in the art will readily appreciate that polymerization product in high yield (i.e., greater than 50%) would not be expected to have the same properties as a polymer prepared using a different isomeric ratio; nor would the composition of a resulting polymer with a monomer enriched in the atypical isomer (here, the exo-isomer) be expected to have the same properties as one prepared using a different isomeric ratio. Lipian fails to provide a reason for one of ordinary skill in the art to modify Lipian in the manner required to meet Claim 29 regarding the isomeric ratio. *In re Laskowski*, 871 F.2d 115, 117, 10 U.S.P.Q.2d 1397, 1398 (Fed. Cir. 1989) (“Although the Commissioner suggests that [the structure in the primary art reference] could readily be modified to form the [claimed] structure, ‘[t]he mere fact that the prior

art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification”) (citation omitted); *In re Stencel*, 828 F.2d 751, 755, 4 U.S.P.Q.2d 1071, 1073 (Fed. Cir. 1987) (obviousness cannot be established “by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion that the combination be made”). Lipian fails to disclose the polymer yield for the above combination of predominantly exo monomer, precatalyst, and co-catalysts. There is no teaching or suggestions to combine elements of the prior art to produce the present invention. The present invention is thus nonobvious.

Lipian thus fails to disclose or teach a method including all the elements explicitly taught in the instant claims of the monomer, the precatalyst, and the cocatalysts in the specific, useful mixture claimed as providing a yield of greater than 50%, and an optical anisotropic film comprising a cycloolefin polymer prepared using the method as claimed in the instant claims, and thus does not make the claims unpatentable. Reconsideration and allowance of the claims is respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejections and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,
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